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Letter dated 29 April 1999 from the Permanent Representative of Australia to the United Nations addressed to the Secretary-General

I have the honour to transmit to you the Executive Summary of the report entitled "A study on the global outlook for plantations". This was developed by Australia to support the United Nations Intergovernmental Forum on Forests (IFF).

I would be grateful if the report could be included in the final list of documents of the Third Session of the IFF to be held in Geneva from 3 to 14 May. Australia will make copies of the report available in Geneva to all members and observers at this session.

The first meeting of the IFF in October 1997 agreed to the listing of a number of new items under Category II (d) (issues needing further clarification) of the IFF programme of work. Category II (d) specifically includes consideration of "future supply and demand of wood and non-wood forest products and services".

To assist the IFF with this issue, Australia has funded a study to examine the future supply and demand for plantations and plantation products. The aims of this study are to collate information on current and expected rates of plantation establishment and expected trends in demand for plantation products; assess the likely implications of plantation expansion on the supply of wood; and identify economic, social and environmental costs and benefits associated with plantations. Australia has coordinated this study on the global outlook for plantations in collaboration with other countries and organizations.

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The findings of this study were presented and discussed at the International Experts Meeting on the Role of Planted Forests for Sustainable Development (Chile, 6-10 April 1999). The attached final version incorporates comments made at that meeting and 10 recommendations for consideration by the IFF (3-14 May 1999) regarding the future supply and demand of wood and non-wood forest products and services.

The initiative involved 16 countries and international agencies in the form of a Steering Committee comprising Australia, Brazil, Chile, China, CIFOR, Egypt, FAO, Fiji, IFF Secretariat, Indonesia, Japan, Korea, New Zealand, South Africa, United Kingdom and USA. A number have made in-kind contributions (expert advice, data and country case studies). Details of how to obtain a copy of the full report will be available on the Internet at http://www.abare.gov.au.

(Signed): Penny Wensley
Ambassador
Permanent Representative of
Australia to the United Nations

Executive Summary
A Study on the
Global Outlook for Plantations

A technical paper for the Intergovernmental Forum on Forests

Commonwealth of Australia
May 1999

Executive Summary - A study on the global outlook for plantations was written by Australian Bureau of Agricultural and Resource Economics (ABARE) and Jaakko Poyry Consulting (Asia-Pacific) Pty Ltd.

The Australian Government gratefully acknowledges the Steering Committee and the Australian Reference Committee for their contributions to the study and constructive comments on the draft report.

Photographic images for this report were provided by ABARE, Jaakko Poyry Consulting (Asia-Pacific) Pty Ltd, CSIRO Forestry and Forest Products and the Australian Centre for International Agricultural Research.

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Details on how to obtain a copy of 'A study on the global outlook for plantations' can be found on the Internet at: http://www.abare.gov.au

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Message from the Minister

Plantations are becoming an increasingly important supply of wood and other forest products to the world but have not received a great deal of attention by the Intergovernmental Forum on Forests or its predecessor, the Intergovernmental Panel on Forests. The Government of Australia has commissioned this study as part of its contribution to the work of the Intergovernmental Forum on Forests. In this endeavour we have welcomed input from the Governments of Brazil, Chile, China, Egypt, Fiji, Indonesia, Japan, New Zealand, the Republic of Korea, South Africa, the United Kingdom, and the United States of America and from the Forestry Department of the Food and Agriculture Organisation, the Center for International Forestry Research and the Intergovernmental Forum on Forests Secretariat. These countries and organisations were invited to form a Steering Committee for the study.

This study considers the future of the world's planted forests. In particular it examines the following three questions:

- How rapidly are new plantations being established?
- What impacts will plantations have on the supply of wood? and
- What are the economic, social and environmental implications of plantation establishment?

While this study provides a useful overview of knowledge concerning plantations and the outlook for global and regional wood supply and demand, the study also reveals large gaps in our knowledge about plantations and their products. For example, our knowledge is particularly poor regarding fuelwood and non-wood forest products.

The study also shows that well-managed planted forests can make a valuable contribution to a country's sustainable development.

A number of issues emerge from this study which require the attention of national Governments, international organisations and the private sector. These issues are presented for consideration by the Intergovernmental Forum on Forests in the form of recommendations.

I commend this study to Governments and the international community. I encourage you to recognise the valuable role that planted forests can play and request your support to progress the recommendations in this study.

Wilson Tuckey
Minister for Forestry and Conservation
Australia

Foreword

Plantations have been recognised as being a significant part of future global wood supply and in the development of forest and environmental policy. However, to date the exact role that plantations can play in these issues has not been well understood.

This technical study has been prepared to provide input into the Intergovernmental Forum on Forests. It is intended that the study will provide technical information that will assist in the Forum's policy deliberation process, on issues relating to the supply and demand for wood and non-wood forest products and services.

To date, research in this area has concentrated on two themes: trade in forest products and the characteristics of plantation development. It is not the intention in this study to duplicate previous research but to use the key findings from recent studies and link them into a compatible and assessable format. From this, gaps in information can be identified and the potential role of plantations in future wood supply determined.

The main focus in this study is on the development of plantations for industrial roundwood; however, for completeness, a brief discussion of the use of plantations for fuelwood is also included.

The aim in producing the report is to help raise the profile of plantations globally by providing an information tool to assist governments, policy makers, industry and landowners in their development of plantation strategies.
The study has been funded by Agriculture, Fisheries and Forestry — Australia (AFFA), with contributions from a number of participating organisations and countries.

Brian S. Fisher
Executive Director
ABARE
(Asia-Pacific) Pty Ltd
May 1999

Rob de Fegely
Executive Director
Jaakko Poyry Consulting

Acknowledgments

This study was managed by Allan Hansard (ABARE) and Rob de Fégely (Jaakko Poyry). Drafting of the report was carried out by Allison Ball, Rob de Fégely, Peter Grist, Allan Hansard, Kevin Johnston, Angela Robinson and David Valentine.

The authors wish to acknowledge the assistance of AFFA for its efforts in the coordination of this project, particularly Gary Dolman and Suzette Searle, who were our main contacts.

We would also like to thank the members of the Steering Committee for this project and their colleagues, who contributed data, papers and reports, as well as comments and advice throughout the drafting process of this report.

We would particularly like to thank Jim Ball and his colleagues at the FAO Forestry Department for the provision of information and their comments throughout the drafting of this report.

We are also grateful for the assistance given by the Australian Reference Committee for this study, as well as the Australian IFF Steering Committee, who reviewed the draft report.

Our thanks are also extended to our internal reviewers from both ABARE and Jaakko Poyry.

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Introduction

Plantation forests (plantations) are playing an increasingly important role in meeting the world's growing requirements for wood and non-wood forest products. While plantations represent less than 3 per cent of the world's forest resources they are estimated to supply around a third of industrial roundwood and 10 per cent of fuelwood. Planted forests also supply a large range of non-wood products and services including animal fodder, cork, nuts and fruit, latex, tannin and oils, and are used for recreation and environmental protection. Plantations are also increasingly important as a focus for international forest policy. However, despite the benefits, the exact role that plantations can play is not well understood.

The first meeting of the Intergovernmental Forum on Forests (IFF) in October 1997 agreed to the listing of a number of new items under Category II (d) (issues needing further clarification) of the IFF program of work. Category II (d) specifically includes consideration of 'future supply and demand of wood and non-wood forest products and services'.

Study objectives

This paper provides technical information for consideration by the IFF rather than material addressing policy issues. Specifically, the main objectives in this study into the global outlook for plantations are to:

- collate information on current and expected rates of plantation establishment and expected trends in demand for plantation products;
- assess the likely implications of plantation expansion on the supply of wood;
- identify economic, social and environmental costs and benefits associated with plantations; and
- develop recommendations, in consultation with the study Steering Committee, to be considered by the IFF.

It is not the intention in this study to duplicate existing work. Rather, the aim is to link key findings of previous studies on trade in forest products and plantation development, such as the Norwegian report (Solberg 1996), the FAO Global Forest Products Outlook Report (FAO 1998a) and the FAO Plantations Consultant Report (Brown 1998), with other recent studies and information. From this, gaps in information are identified, the potential role of plantations assessed and recommendations on raising the global profile of plantations are developed.

The main focus in this study is on the development of plantations for industrial roundwood; however, for completeness, a brief discussion of the use of plantations for fuelwood and non-wood forest products is also included.

Defining plantation forests

A continuum exists from highly protected conservation forests to productive, short rotation planted forests, and the interface between some planted and natural forests is indistinct. As a result, a clear definition of plantation forests is difficult to make. Most definitions identify the degree of management as the determining factor between a plantation and a natural forest. Lund (1998), in a paper reviewing definitions of forest, deforestation, afforestation and reforestation, observed 17 definitions of plantation.

This study has used the definition developed by FAO for the Temperate and Boreal Forest Resource Assessment 2000 (FAO 1998b), which identifies plantations as:

> 'forest stands established by planting and/or seeding in the process of afforestation or reforestation. They are either: of introduced species (all planted stands), or intensively managed stands of indigenous species, which meet all the following criteria: one or two species at planting, even age class, regular spacing.'

Location, species and ownership of plantations

Industrial plantations are the focus of this study, as data on fuelwood and non-wood products is either unavailable or was difficult to obtain with the short time available for this study.

Of the 115.9 million hectares of plantations established, most (62 per cent) is located in the traditional wood producing regions (as defined by FAO) of Europe and the former Soviet Union and North and Central America (table i). However, in recent times significant planting has occurred in the temperate and subtropical areas of Africa, South America, Asia and Oceania.

Table i: **Global industrial plantations at a glance**

	FAO Statistical Regions						
	Africa	North & Central America	South America	Asia	Europe/ Former Soviet Union	Oceania	World
Industrial plantations area (million hectares)	3.9	24.2	7.8	30.1	47.1	2.8	115.9
Total effective area (million hectares)	1.4	24.2	7.5	11.2	47.1	2.5	93.9

Plantation area suitable for commercial wood production (%)	36	100	96	37	100	89	81
Species planted (% softwood : % hardwood)	50 50	98 2	53 47	31 69	88 12	90 10	71 29
Ownership levels (% public : % private)	na	60 40	0 100	na	50 50	33 67	na

Na: Not Available

Source: Global Outlook for Plantations Database

Over 60 per cent of the plantations in Asia and Africa have been assessed as unsuitable for commercial wood production because of low productivity, poor management and poor species selection. Some of these have been planted for fuelwood or environmental benefits. This is in contrast to plantations in other regions, where most of the plantations are for commercial wood production. The total area of industrial plantations effectively available for commercial wood production is around 94 million hectares (table i).

Over 70 per cent of plantation forests are softwood species (coniferous species). Softwood species dominate plantations in North & Central America, Europe & former USSR, and Oceania, with significant softwood resources also in the temperate regions of South America and Africa (mainly Chile and South Africa) (table i). Hardwood species (non-coniferous species) dominate plantations in the tropical regions of Asia and the north of South America (mainly Brazil), and there are also significant hardwood plantations in southern Europe (mainly Spain and Portugal). The establishment of hardwood plantations is also increasing in temperate regions of South America, Africa and Oceania. Growth rates are influenced by factors such as the site, species and silvicultural management and vary from less than 7 cubic metres per hectare a year to well over 30 cubic metres per hectare a year. Establishment costs (excluding land purchase) vary also from US$1500 to US$2500 per hectare for softwood and US$1800 to US$4200 per hectare for hardwood plantations.

There is a trend, particularly in the southern hemisphere, away from government development and ownership of plantations to ownership by processing companies, landowners or individual investors. The plantations in South America are mostly privately owned and there is a trend to private ownership in Oceania where most of the plantations were established by governments. However, this is not global, with Europe & former USSR and parts of Asia likely to maintain high levels of public ownership in the future, due to different political objectives.

Costs and benefits of plantations

Unlike many other land uses, plantation development is considered a long term venture, with rotation lengths ranging from five to over fifty years. Plantation development can result in economic, environmental and social costs and benefits.

Economic benefits arise from species and provenance selection and silvicultural regimes that are designed to increase wood production and improve rates of return.

The development of industrial plantations usually depends on factors such as the suitability of land and the proximity to markets and existing infrastructure. In the majority of cases, industry has developed in conjunction with the plantation resource. The development of industry and careful site selection has allowed greater specialisation in growing, harvesting, transporting, processing and marketing of wood. Technological advances in tree breeding and genetic improvement, site preparation, weed control and silviculture have resulted in improvements in commercial yield, health and vigour. As a consequence plantations can now be established on a wider range of sites, with varying silvicultural regimes, resulting in cost savings in management and harvesting and processing. A good example is the development of Eucalyptus globulus to improve its pulping and fibre characteristics, making it highly suitable for the production of fine writing papers. Plantations are now a significant source of industrial wood, with South America and Oceania sourcing more than half of their wood supply from plantations.

Over half the world's production of wood is used for fuel. Consumption of fuelwood is thought to be around 1.7 billion cubic metres a year, although some say this figure is an understatement of total consumption given that it is very difficult to measure. Almost 90 per cent of fuelwood is consumed by developing countries in Asia, Africa and South America. Plantation establishment for fuelwood began on a large scale in the late 1970s, largely in Asia and Africa. Plantation wood from these regions now supplies around 10 per cent of the global fuelwood demand.

Environmental benefits are harder to quantify. Plantations established for site rehabilitation on degraded land can increase biodiversity, and provide improved soil structure, increased soil organic matter and fertility and improve the local microclimate. Plantations of native species, in particular, can contribute to achieving conservation goals and protect core conservation areas. They can also be used to provide corridors between protected areas, control water runoff, provide shelter from wind, heat and sand storms and lower water tables in saline areas. Wood production is not necessarily excluded from plantations developed for environmental protection and in fact the need for wood may be the catalyst for planting. There has been little work to quantify the economic value of environmental protection from plantations. However, the benefits are likely to be significant.

Potential environmental costs can include the simplification of ecosystems, sedimentation and pollution from fertilisers and weedicides. Problems can also arise if plantations reduce the availability of water for other uses. Disease and pest incidence may rise in a plantation, with a potential impact on surrounding land uses.

The social benefits of plantations include employment, the generation of infrastructure (such as roads, communications, housing) and byproducts (such as fuelwood and other non-wood products to remote areas). Governments have encouraged the establishment of plantations to achieve a range of economic and social objectives including the development of rural economies. Plantations can provide a stable form of employment throughout the rotation (establishment, management, harvesting) and in the processing of wood. Grown as a woodlot or integrated into existing land uses, plantations can also provide a supplementary form of income to farmers and landholders as well as providing the environmental benefits discussed above.

Negative social impacts of plantations are usually associated with reduced access to forests for local people and limited rights to use land for traditional activities. To minimise the potential for these social costs, care needs to be taken in plantation design and management to ensure the rights of landowners are considered in developing future plantations.

Where unacceptable economic, social and environmental costs have been identified, they are usually found to be a result of deficiencies in project design and/or management. Full consideration of economic, social and environmental factors in the planning and management of plantations can assist in maximising benefits and minimising costs.

Factors shaping plantation development

There are a number of economic, social and environmental factors that have shaped plantation development in the past and will influence future plantations.

Government involvement

Governments can become involved in plantation development to overcome perceived market failures created by the nature of plantation investments. The long term nature of plantation development is associated with a number of factors that can make plantation investment unattractive to the private sector. These can include: the high risk of investment; the high cost of financing the investment; the long period of investment, with high initial costs for establishment and revenue received only on harvest; the need for a critical mass of wood availability before processing facilities can be developed; lack of information on appropriate species, establishment and management techniques; lack of regional infrastructure to support plantation development; high risk of marketing products especially for small wood from thinnings; and the lack of secondary plantation markets to allow sale of plantations prior to harvesting. The type and magnitude of risks associated with plantings can vary significantly between developed and developing countries and between regions.

Governments can also use plantation developments to meet specific economic, social or environmental policy objectives, including assisting forest industry development, increasing regional infrastructure and employment, and overcoming forest product trade imbalances.

Government policy has been a significant factor in the growth in planted areas over the past 30 years. Large scale plantation development began largely as a government activity in most parts of the world, including the United Kingdom, Australia, Chile and New Zealand. Plantations were developed through direct government involvement or through government incentive schemes, including taxation incentives, loans against subsidised interest rates and other conditions or by grants.

The appropriate role of government in plantation forestry remains an issue of debate, given the demand for forests to supply non-industrial wood products and non-wood products. Since many countries are divesting themselves of their public plantation assets, this may reduce access to many of the non-wood benefits of plantations, or place a cost on these assets that were traditionally provided free of charge.

Markets

Both changing and emerging markets will influence plantation development. New markets in North Asia have resulted in expanded plantation development within and close to this region. Technological advances will also affect plantation development. For instance, tree breeding has improved yields and the quality of products harvested, while new processing technology — such as reconstituted panel boards (eg MDF) and glue laminated products (eg laminated veneer lumber) — is producing more product with less and/or lower quality input.

The emergence of carbon markets has captured the attention of the plantation industry recently, with the possibility of selling the rights to carbon sequestered in plantations. The Kyoto Protocol (11 December 1997), and the subsequent Conference of Parties at Buenos Aires (November 1998), raised the possibility that, where certain conditions are met and where areas can be accurately measured and verified, plantations established since 1 January 1990 may be used to meet countries' Kyoto Protocol targets. Carbon sequestered by these forests could count toward meeting emission commitments or be used in emissions trading. Although international regulations and guidelines on emissions trading and the definitions of forests that could be counted are still in the early stages of negotiation, a small number of trades in the right to carbon sequestered by plantations have occurred in anticipation of carbon sequestration markets developing. There is a potential for carbon markets to influence plantation development and associated wood processing if a trading system is implemented. However, the likely implications for the expansion of plantations are unknown.

Advances in the manufacture of wood products have allowed reconstituted wood products such as particleboard and medium density fibreboard (MDF) to substitute for many solid wood products. While global production of solidwood products has not increased over the past decade, world production of wood based panels has risen by 80 per cent (FAO 1997). Reconstituted and glue laminated products, which can use low grade small diameter logs, favour plantation grown wood. The trend away from solidwood products is expected to

continue and although reconstituted board products may never replace some solidwood products, particularly those used in decorative and high quality furniture uses, there is still significant market share to be gained.

Land availability

Land availability is a key factor that will determine future plantation expansion. For environmental reasons, the majority of plantation development will occur on surplus agricultural land. Regional characteristics and insufficient information make the accurate estimation of the global or even regional areas suitable for plantation development difficult. Estimates vary greatly. Nilsson and Schopfhauser (1995) suggested that globally there are around 345 million hectares of land presently used for agriculture that could potentially be available for plantations and agroforestry, while Grainger (1988) assessed degraded lands in the tropics and estimated that there were about 758 million hectares suitable for plantation development. Land availability is suggested as a major factor in a rising trend of wood supply from the southern hemisphere.

Although demand for forest products is likely to increase in the future, the supply from natural forests is not expected to increase, and may even decrease. As a result, plantations are expected to supply the bulk of any increase in supply. For plantation expansion to occur, plantations will need to be successful in competing for available land with agriculture and other land uses. Additionally, user rights will have a significant impact on the use of agricultural land for conversion to plantations.

Environmental issues

Over the past decades, the way in which society perceives forests has changed. There is increasing focus on the way forests are managed and used. This has resulted in an increase in the area of natural forests set aside as parks and reserves and has limited harvesting activities in natural forests. There is increasing community pressure to improve forest management and harvesting practices and ensure sustainability of all natural forest values. This has increasingly limited the volume of wood harvested from natural forests. As a result, the cost of accessing these forests has increased, creating market opportunities for wood substitutes and wood from plantations or intensively managed accessible natural forests.

To encourage sustainable management, the certification of forest products is being promoted in a number of markets, particularly in parts of Europe. In plantation grown forests, certification is likely to target poor management, the underlying cause of many of the environmental and social costs associated with plantations. A study by Evans (1997) has shown that plantation forestry is sustainable in terms of wood yield in most situations, provided good management practice is maintained. Any problems with potential loss of productivity between successive rotations could be overcome through adjustments to management practices and, in some cases, through the use of fertilisers.

Globalisation of the forest industries

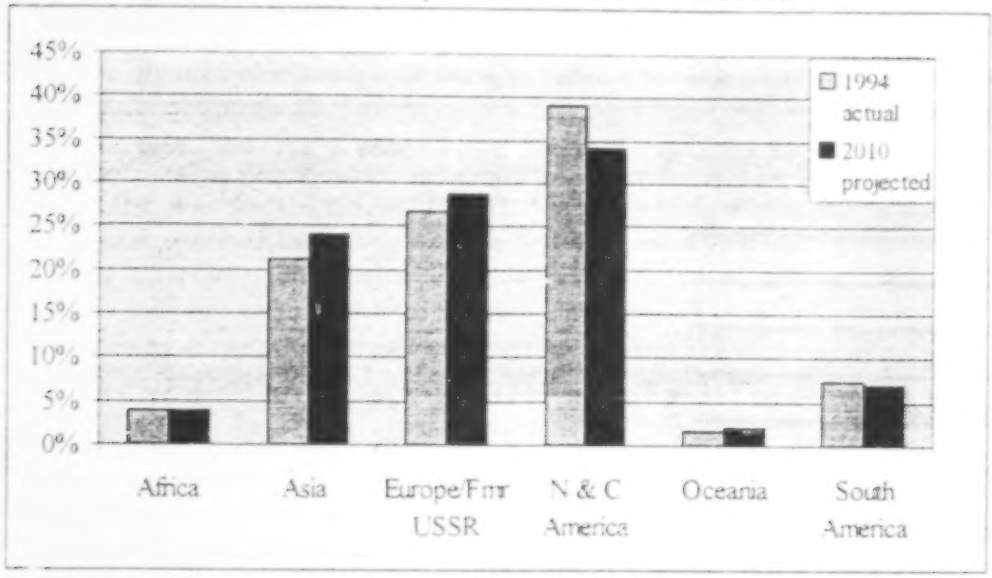
The forest product economy is now global, with international trade in forest products quadrupling since the 1960s. Improved transport systems and worldwide integration of markets for forest products has resulted in wood from one part of the world being shipped to another for processing or sale. World scale, cost efficient processing facilities require mills to be located close to large wood resources. Many of these facilities, such as pulpmills often require wood fibre of a homogeneous quality. These factors favour the development of industrial plantations.

Outlook for wood products

There have been a number of recent studies into the long term demand and supply of wood (see, for example, Solberg 1996, Sedjo and Lyon 1996, Sohngen et al 1997, FAO 1998a). Some of these studies were conducted before the 1997-98 economic crisis in Asia. However, many analysts agree that the downturn will have only a moderate impact on economic growth in the longer term and hence would not necessarily affect the relevance of these studies. It is generally agreed that average annual demand for roundwood will increase by 1—2 per cent a year over the coming decade. Indicative forecasts of consumption (production + imports - exports) by Sedjo and Lyon (1996) suggest that consumption will increase from 1.7 billion cubic metres in 1995 to around 2.3 billion cubic metres by 2045.

These forecasts also reflect the increasing trend in consumption of pulpwood for reconstituted wood panels and paper. Pulpwood consumption is forecast to increase from 700 million cubic metres in 1995 (41 per cent of total industrial roundwood) to around 1.33 billion cubic metres by 2045 (58 per cent of total industrial roundwood). Along with changes to the quantity and type of wood demanded, there are also changes to the regional demand patterns. Based on FAO (1998a) consumption estimates to 2010, Asia and Europe & the former USSR are likely to increase their share of global wood consumption, South America, Africa and Oceania are estimated to retain their share, while North & Central America is expected to decrease its share (figure i). These estimates confirm the views of many analysts that, driven by increasing economic development and population growth, Asia is emerging as an important future market for wood products. Much of the growth in consumption in Europe & the former USSR is likely to come from the developing economies of countries in the former USSR.

Figure i. **Regional share of consumption of industrial roundwood**



Source: FAO 1998a

As with demand, there are likely to be similar changes in the regional patterns of roundwood supply. Regional analysis by FAO (1998a) indicates that Asia and Europe and the former USSR will increase their share of global supply. South America, Africa and Oceania will maintain their share, while North & Central America is expected to decrease its share. In Asia, although there will be some declines in supply from natural forests, there will be increasing supplies from plantations. Much of the supply increases in Europe & the former USSR are likely to come from natural forests in the former USSR, though the high costs of accessing these forests will constrain production. Increasing supply from South America, Africa and Oceania is expected from the increasing plantation resource in these regions. Any increase in supply from North & Central America is likely to come from natural forests in Canada and a growing supply of wood from plantations in the southern part of the region. The United States is unlikely to increase wood supply from natural forests.

Potential supply from plantations

By assessing regional potential, including existing natural forests and plantations, suitable land, infrastructure, access to plantation technology, and political and economic stability, estimates of wood supply from plantations, by region, were made to 2040. Future increases in global supply of wood will be largely from plantations. Industrial wood supply from plantations is estimated to increase by 67 per cent, from 624 million cubic metres in 2000 to 1043 million cubic metres by 2040. Plantations are estimated to meet 35 per cent of estimated global demand for industrial wood by 2000. This is estimated to increase to

44 per cent by 2020 and 46 per cent by 2040 (see Table ii). For all regions this would require a significant increase in plantation area and/or substantial gains in plantation productivity.

Table ii. **Predicted contribution of plantation wood to regional wood supply**

	2000	2020	2040
	(%)	(%)	(%)
Africa	20	39	40
Asia	32	46	48
Europe / former USSR	46	53	55
N & C America	22	29	31
Oceania	55	66	67
South America	63	65	66
World	25	44	46

This future expansion of plantations and their role in supplying wood products was largely determined by the competitiveness of plantation wood against other sources of wood and product substitutes and the competitiveness of plantations as a land use against agriculture, urban use and other uses. Location, ease of harvest, fibre quality and so on, leading to improved efficiency and lower delivered cost of wood, are important in this respect.

Natural forests have traditionally maintained a competitive advantage over plantation forests, due to the high cost of intensively managing plantations. However, this gap is narrowing due to improvements in productivity and efficiency of plantations, the decreasing availability of wood from natural forests and also the increasing cost of accessing these forests. Markets are recognising the increasing competitiveness of plantations. For instance, the world's largest importer of hardwood woodchips, Japan, has increased use of wood from plantations. The major Japanese companies using woodchips have set targets to source a significant amount of their woodchip imports (currently around 10 million bone dry tonnes of hardwood and 3 million bone dry tonnes of softwood) from plantations. This is mainly to reduce costs and ensure uniformity of the wood fibre.

Recommendations

An objective in this study is to identify proposals for action that will assist in raising the profile of plantations globally. The recommendations have been developed in consultation with the study steering committee and are put forward for consideration by the Intergovernmental Forum on Forests.

Definition of plantations

1 Call on countries to adopt an internationally agreed definition of plantations

Global and regional plantation expansion

2 Call on countries to work with the FAO to improve the accuracy of data on plantation areas

3 Call on countries and relevant international organisations such as International Tropical Timber Organisation (ITTO) and FAO to develop and implement forest product statistics databases which clearly segregate wood products derived from natural forests from those derived from plantations

4 Call on countries and international organisations to support a study on the supply of, demand for and value of fuelwood and non-wood forest products, as called for in Proposals for Action by the Intergovernmental Panel on Forests

Emerging issues

5 Call on countries and international organisations to conduct research studies on the long term (over several rotations) sustainability of plantations from economic, social and environmental perspectives

6 Call on countries to implement appropriate codes of practice and guidelines for plantation management, and criteria and indicators of sustainability. There is an expectation that some form of voluntary certification of sustainability will be required

7 Call on countries to contribute to assessing the likely impact of developing carbon markets on plantation development and forest product markets

8 Call on countries and international organisations to undertake studies to identify and report on the availability of land for plantation expansion from biophysical and economic perspectives, taking into account relevant social and environmental constraints

Costs and benefits of plantations

9 Support international organisations and countries to work with FAO to develop a better understanding of, and methods of quantifying, the social and environmental costs and benefits of plantations, including those developed for fuelwood, and to exchange the relevant information

10 Call on countries to identify and remove obstacles to plantation development and trade in the context of the emerging importance of plantations in supplying wood and non-wood requirements

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